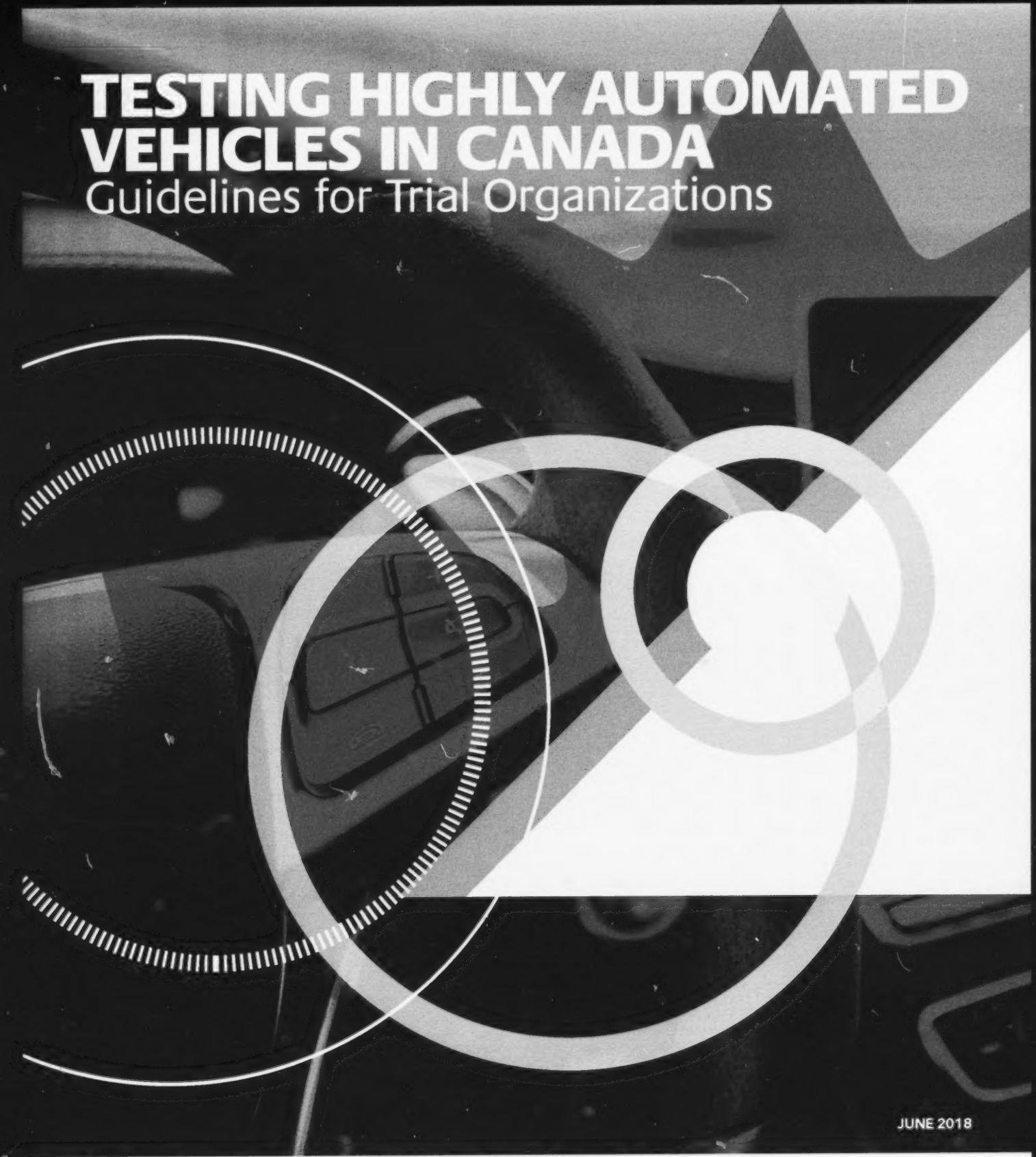
TESTING HIGHLY AUTOMATED VEHICLES IN CANADA

Guidelines for Trial Organizations



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Prepared by Transport Canada in collaboration with the Canadian Council for Motor Transport Administrators 5/16/2018

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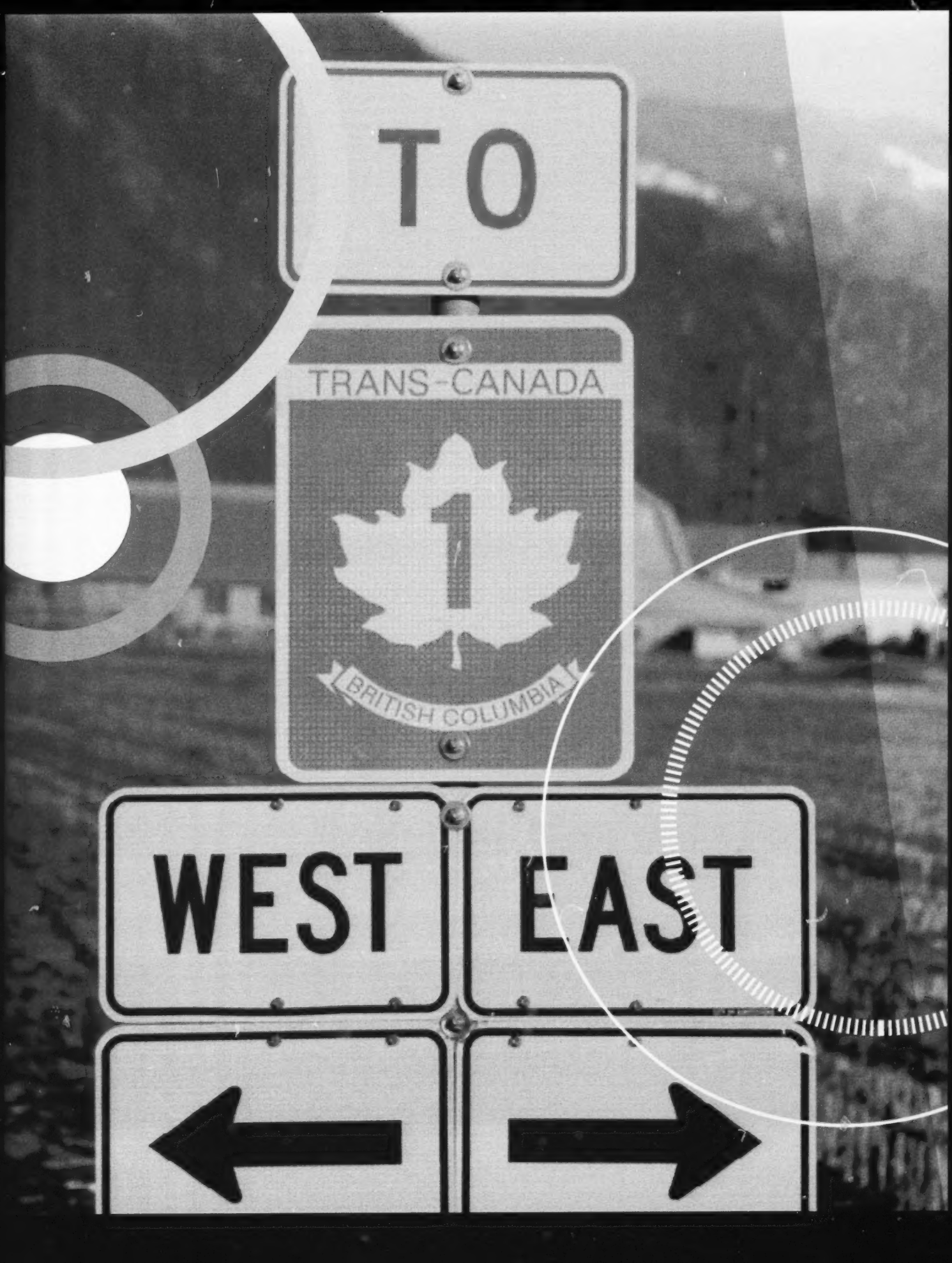
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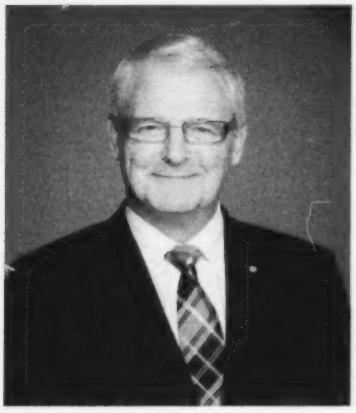
MESSAGE FROM THE MINISTER OF TRANSPORT



It is my great pleasure to introduce *Testing Highly Automated Vehicles in Canada: Guidelines for Trial Organizations*, a joint collaboration between Transport Canada and the Canadian Council of Motor Transport Administrators (CCMTA).

For well over a century, motor vehicle technology has played a vital role in enhancing Canada's transportation system, connecting Canadian communities, businesses and families across one of the world's largest roadway networks.

Today, with the introduction of highly automated vehicles, we are witnessing a pivotal shift in motor vehicle technology that will transform many aspects of Canadian life. Highly automated vehicles hold great promise to improve the efficiency of Canada's transportation system, as well as increase mobility choices and create new economic opportunities for Canadians.

Most importantly, highly automated vehicles hold the promise of safer roads for Canadians. In 2016, 1,898 people lost their lives in motor vehicle collisions in Canada. It is our goal that automated vehicles, in time, and in concert with other policy measures, will help us to drastically reduce this number.

Public confidence in these new vehicle technologies will be key to their successful adoption. For us to enjoy the benefits of highly automated vehicles, we will need to test them on our roadways, in our communities, and in our diverse Canadian climates. Facilitating these tests will require close collaboration among all levels of government and vehicle developers, to ensure that we support innovation without compromising safety.

These guidelines will help to ensure that trials are conducted in a safe and secure manner, according to a set of consistent, national minimum requirements. This document also clarifies the roles and responsibilities of each level of government in facilitating these tests, and will serve to promote Canada as a leading destination for research and development of automated vehicles.

I would like to thank the CCMTA, our provincial and territorial colleagues, and the many stakeholders that were involved in the development of these guidelines. This document represents just one of many steps that we will be taking to promote the safe use of highly automated vehicles in Canada. In keeping with our Transportation 2030 strategic plan, the Government of Canada will continue to work with other levels of government, our international colleagues, and a wide range of stakeholders to ensure all Canadians benefit from this transformative technology in the years to come.

Marc Garneau

The Honourable Marc Garneau, P.C., M.P.
Minister of Transport

TESTING HIGHLY AUTOMATED VEHICLES IN CANADA:
GUIDELINES FOR TRIAL ORGANIZATIONS

INTRODUCTION

The development of automated vehicle technologies shows great potential to enhance the safety, mobility and productivity of Canadians.

In order to achieve the many positive outcomes promised by these technologies, it is essential that jurisdictions and automated vehicle developers work together to ensure that these vehicles are safe for Canadians to use – a process which must include test trials in the diverse real-world environments and conditions that may be encountered on Canada's public roads.

This document establishes a series of guidelines to direct the safe conduct of highly automated vehicle trials in Canada, agreed upon by federal, provincial and territorial representatives of the Canadian Council for Motor Transport Administrators (CCMTA).

PURPOSE OF THE GUIDELINES

This document seeks to clarify for trial organizations[1] the various roles and responsibilities of federal, provincial and territorial levels of government involved in facilitating trials.

These guidelines also establish a set of voluntary minimum safety requirements that trial organizations are expected to follow when operating in Canada. Provincial and territorial jurisdictions are still responsible for approving requests from trial organizations, based on their respective laws and regulations, and building upon these minimum requirements as they deem necessary.

Provinces and territories are encouraged to consult the *Canadian Jurisdictional Guidelines for the Safe Testing and Deployment of Highly Automated Vehicles*, in conjunction with this document, to inform the development of their testing and deployment policies and regulations. Recognizing that highly automated vehicle technologies continue to evolve, these guidelines will be updated as needed by CCMTA member jurisdictions to ensure alignment with safety needs, as well as international trends and best practices. Provisions of these guidelines may also be further clarified as experience is gained through implementation. As a starting point, Transport Canada will work with jurisdictions and stakeholders to clarify a minimum list of events that constitute *serious incidents*[2]; promote consistent approaches for reporting requirements; and clarify expectations and processes related to trial declarations.

1 See definition of trial organization on page 8.

2 See definition of serious incident on page 8.

SCOPE OF THE GUIDELINES

This document applies to the conduct of trials of Highly Automated Vehicles (HAVs), otherwise referred to as Automated Driving Systems (ADS)[3], on public roads in Canada[4]. These guidelines are intended to cover temporary trials of ADS vehicles, not their permanent market deployment, the requirements for which will be developed by federal, provincial, and territorial jurisdictions as this technology continues to evolve.

EXPECTATIONS OF TRIAL ORGANIZATIONS

The responsibility for ensuring the safe and orderly conduct of trials rests with the trial organization conducting these tests. Trial organizations should ensure that their trial activities are consistent with the requirements outlined in this document.

Trial organizations must at all times comply with existing federal, provincial and territorial laws and regulations pertaining to motor vehicle safety requirements and safe vehicle use, and keep themselves apprised of any changes to these laws and regulations.

In the event that a province or territory chooses to impose additional or separate requirements from the minimum ones outlined in these Guidelines, the requirements imposed by that jurisdiction will prevail and must be followed by the trial organization. Contact information for each jurisdiction is provided in Annex A.

ROLES AND RESPONSIBILITIES OF EACH LEVEL OF GOVERNMENT

In Canada, motor vehicle transportation is a shared responsibility between federal, provincial and territorial governments. Transport Canada, under the *Motor Vehicle Safety Act* (MVSA), establishes safety regulations for the manufacture and importation of motor vehicles, as well as designated motor vehicle equipment, and the shipment of newly manufactured vehicles and equipment across provincial/territorial boundaries. The objective of these regulations is to reduce the risk of death, injury, and damage to property and the environment.

Provinces and territories are responsible for the licensing of drivers, vehicle registration and insurance, as well as laws and regulations regarding the safe operation of vehicles on public roads. As such, provinces and territories are also responsible for approving and overseeing trials of automated vehicles that take place within their jurisdiction. These jurisdictions are encouraged to engage Transport Canada in this process to seek their input and views on applications and trial practices.

Falling under the jurisdiction of provinces and territories, municipal governments, to varying degrees, are responsible for: the enactment and enforcement of by-laws concerning vehicle movement; the use of local infrastructure; and, the provision of public transportation in their respective jurisdictions. Trial organizations are encouraged to engage municipal authorities, in conjunction with the relevant provincial/territorial road transport agency, to ensure local traffic and infrastructure considerations are addressed and that local law enforcement and emergency response personnel are appropriately informed about trial operations.

Notwithstanding these distinct roles and responsibilities, all levels of government are encouraged to work together to share information and to foster learning among each other and with trial organizations, to facilitate the safe testing and eventual deployment of these technologies on Canadian roads. Transport Canada will work with trial organizations and other jurisdictions to support these learning opportunities and collaborations moving forward.

3 See definition of Automated Driving System on page 7;

4 These guidelines may apply to all on-road motor vehicle types. However, it is at the discretion of the provinces and territories to determine what types of vehicles may be trialed in their jurisdictions. Future versions of this document may explore requirements for specific vehicle types, or certain trial activities, such as cooperative truck platooning.

TABLE 1:
FEDERAL, PROVINCIAL/TERRITORIAL, AND MUNICIPAL RESPONSIBILITIES

FEDERAL AREAS OF RESPONSIBILITY[5]

Transport Canada:

> Setting and enforcing compliance with safety standards for manufactured and imported vehicles (including the import of trial vehicles) as well as motor vehicle equipment (tires and child car seats);

> Investigating and managing the recall and remedy of non-compliances and safety-related motor vehicle defects;

> Motor vehicle safety research; and

> Public education on motor vehicle safety issues.

Innovation, Science and Economic Development Canada:

> Setting and enforcing compliance with technical standards and licensing requirements related to wireless technologies integrated in vehicles and roadside infrastructure (for trials involving the testing of connected vehicle technology).

PROVINCIAL/ TERRITORIAL AREAS OF RESPONSIBILITY

> Driver Licensing;

> Vehicle Registration;

> Enacting and enforcing traffic laws and regulations (including trials);

> Conducting safety inspections;

> Regulating motor vehicle insurance and liability;

> Public education on motor vehicle safety issues;

> Adapting infrastructure to support AV deployment.

MUNICIPAL AREAS OF RESPONSIBILITY[6]

> Enacting and enforcing by-laws;

> Enforcing traffic laws and regulations;

> Advocating for and accommodating testing;

> Adapting infrastructure to support AV deployment;

> Managing passenger transportation (including public transit and taxi cabs);

> Parking;

> Traffic control; and

> Public education on motor vehicle safety issues.

5 These are the principle federal authorities relating to road safety. Other laws and regulations outside of this scope may apply to trial vehicles, depending on the technologies and equipment incorporated. Trial organizations are responsible for determining which laws apply to their specific vehicles.

6 Authorities in these areas may vary depending on the size of the municipality and the powers accorded to it by the provincial or territorial government. Trial organizations should consult with the provincial/territorial road transport agency to determine what municipal approvals may be required.

DEFINITIONS

The following definitions were sourced from SAE International's *Surface Vehicle Recommended Practice: Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles*, J3016 (2016) and were reprinted with SAE International's permission[7]. This document can be accessed for free from the SAE International website at: **https://www.sae.org/**

Automated Driving System (ADS): the hardware and software that are collectively capable of performing the entire Dynamic Driving Task (DDT) on a sustained basis, regardless of whether it is limited to a specific Operational Design Domain (ODD); this term is used specifically to describe a level 3, 4, or 5 driving automation system.

ADS-dedicated vehicle (ADS-DV): a vehicle designed to be *operated* exclusively by a level 4 or level 5 ADS for all trips.

NOTE: An ADS-DV is a truly "driverless" vehicle. However the term "driverless vehicle" is not used herein because the term has been, and continues to be, widely misused to refer to any vehicle equipped with a driving automation system, even if that system is not capable of always performing the entire DDT and thus involves a (human) driver for part of a given trip. This is the only category of ADS-operated vehicle that requires neither a conventional nor a remote driver during routine operation.

Driver: a user who performs, in real-time, part or all of the DDT and/or DDT fallback for a particular vehicle.

NOTE: In a vehicle equipped with a driving automation system, a driver may in some vehicles assume or resume performance of part or all of the DDT from the driving automation system during a given trip.

Remote Driver: a driver who is not seated in a position to manually exercise in-vehicle braking, accelerating, steering, and transmission gear selection input devices (if any) but is able to operate the vehicle.

NOTE: a remote driver can include a user who is within the vehicle, within line of sight of the vehicle, or beyond line of sight of the vehicle.

Dynamic Driving Task (DDT): all of the real-time operational and tactical functions required to operate a vehicle in on-road traffic, excluding the strategic functions such as trip scheduling and selection of destinations and waypoints, and including without limitation:

1. Lateral vehicle motion control via steering (operational);
2. Longitudinal vehicle motion control via acceleration and deceleration (operational);
3. *Monitoring* the driving environment via object and event detection, recognition, classification, and response preparation (operational and tactical)
4. Object and event response execution (operational and tactical);
5. Maneuver planning (tactical); and
6. Enhancing conspicuity via lighting, signaling and gesturing, etc. (tactical).

Dynamic Driving Task (DDT) Fallback: the response by the user or by an ADS to either perform the DDT or achieve a minimal risk condition after occurrence of a DDT performance-relevant system failure(s) or upon ODD exit.

7 Definitions are subject to change as the SAE periodically revises their taxonomy and definitions related to driving automation systems. Definitions in this document may be updated periodically to reflect changes to the J3016 standard.

(Human) User: a general term referencing the human role of interacting with a driving automation system.

Minimal Risk Condition: a condition in which a user or an ADS may bring a vehicle after performing the DDT fallback in order to reduce the risk of a crash when a given trip cannot or should not be completed.

Object and Event Detection and Response (OEDR): the subtasks of the DDT that include monitoring the driving environment (detecting, recognizing, and classifying objects and events and preparing to respond as needed) and executing an appropriate response to such objects and events (i.e., as needed to complete the DDT and/or DDT fallback).

Operate (a motor vehicle): collectively, the activities performed by a (human) driver (with or without support from one or more level 1 or 2 driving automation features) or by an ADS (level 3–5) to perform the entire DDT for a given vehicle during a trip.

Operational Design Domain (ODD): the specific conditions under which a given driving automation system or feature thereof is designed to function, including, but not limited to, driving modes.

NOTE: An ODD may include geographic, roadway, environmental, traffic, speed, and/or temporal limitations.

Passenger: a user in a vehicle who has no role in the operation of that vehicle.

Request to Intervene: notification by the ADS to a driver indicating that they should promptly perform the DDT fallback.

OTHER TERMS

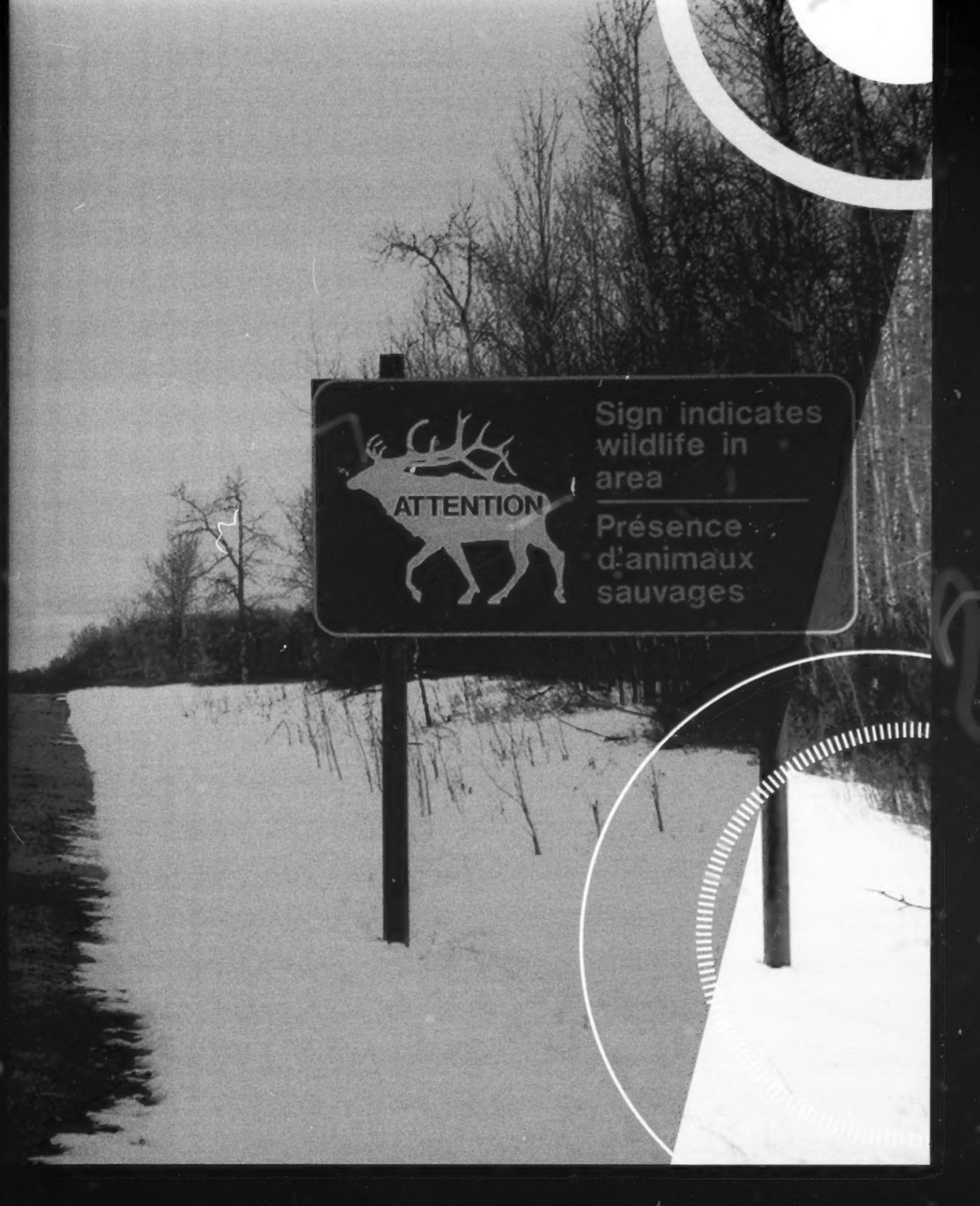
In some instances, this document uses additional terms not included in the SAE's *Taxonomy and Definitions* (J3016) to supplement key concepts and to ensure accessibility of the text for non-technical audiences. For example, in some instances we use the term "Highly Automated Vehicle", which can be considered in this document to refer to the same vehicles as those that meet the description of the J3016 term "Automated Driving System."

Disengagement (of the ADS): a deactivation of the automated mode when a failure of the ADS is detected or when the safe operation of the highly automated vehicle requires that the driver or remote driver assume immediate operation of the vehicle or, in the case of ADS-dedicated vehicles, that the ADS system be deactivated for the safety of the vehicle, its occupants, or other road users.

Highly Automated Vehicle (HAV): the hardware and software that are collectively capable of performing the entire DDT on a sustained basis, regardless of whether it is limited to a specific ODD; this term is used specifically to describe a level 3, 4, or 5 driving automation system.

Serious Incident: any reportable collision involving a trial vehicle (that meets the jurisdiction's reporting threshold for collisions); a contravention of a traffic law that compromises safety, such as unsafely exceeding the speed limit or a red light violation; or, a scenario where safety is otherwise compromised.

Trial Organization: a company or organization seeking to trial an ADS in Canada, including original manufacturers of automated vehicles, technology companies, academic or research institutions, and manufacturers of parts, systems, equipment or components for automated driving systems.


ATTENTION
Sign indicates wildlife in area
Présence d'animaux sauvages

TRIAL GUIDELINES
PRE-TEST CONSIDERATIONS:

1 COMPLIANCE WITH FEDERAL AND PROVINCIAL/ TERRITORIAL REQUIREMENTS

COMPLIANCE WITH FEDERAL REQUIREMENTS

Trial organizations must ensure that the HAV conforms to Transport Canada's *Motor Vehicle Safety Act* (MVSA) including requirements pertaining to imported vehicles and the shipment of vehicles across provincial/territorial boundaries. Questions pertaining to Transport Canada requirements can be directed to the contacts outlined in Annex A.

If a trial organization conducting tests of an automated driving system also intends to incorporate the use of wireless technologies (e.g. Dedicated Short Range Communications (DSRC)–to test connectivity capabilities with other vehicles and infrastructure), the trial organization must ensure that the trial complies with all certification and licensing requirements, including procedures administered by Innovation, Science and Economic Development Canada (ISED). For more information, please visit the following webpage: **http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01742.html**. Trial organizations are also encouraged to notify the relevant provincial or territorial authorities of trials involving connected vehicle technologies.

COMPLIANCE WITH PROVINCIAL/ TERRITORIAL REQUIREMENTS

Prior to conducting trials, a trial organization must ensure that it has obtained the appropriate authorizations from the province or territory where the tests will be conducted, as applicable, including any required permits/approvals/authorizations, or other requirements that may be specified by the jurisdiction as part of their trial approval processes. These authorizations may include consultations with, and/or approvals from, the municipalities involved.

Unless otherwise specified by the province or territory, trial organizations must ensure that they comply with all existing vehicle registration, driver licensing, insurance requirements and road safety rules established by the jurisdiction in which the trial takes place.

Jurisdictions should also include provisions for suspension or revocation of any permit to test on public roads if trial organizations violate permit conditions as part of the application processes. They may also impose penalties should the trial organization continue to operate/test in violation of that suspension or revocation order. Trial organizations will be held responsible for violations of existing traffic laws subject to existing legal processes.

Questions pertaining to provincial/territorial requirements for conducting trials can be directed to the contacts outlined in Annex A.

2 GENERAL SAFETY REQUIREMENTS

PRIOR TESTING REQUIREMENTS FOR TRIALS

Trial organizations should ensure that all trial vehicles have undergone sufficient testing (as determined by the trial organization) in a closed course (e.g. closed roads, parking lots, or test tracks), on-road in another jurisdiction, and/or through other validation mechanisms (i.e. computer simulations) prior to commencing a trial on public roads with other road users.

Tests should consider the various environmental, road, and traffic conditions that can reasonably be expected to be encountered within the geographical area and timeframe for the planned trial.

COMMUNICATION PLANS TO INFORM THE PUBLIC AND OTHER ROAD USERS OF TRIALS

Trial organizations may be directed by the provincial/territorial road transport agency to label trial vehicles and/or develop a communications plan to inform the public and other road users of trials on public roads. Alternatively, provincial and territorial road transport agencies may choose to develop their own communication plans to notify the public of trials on public roads.

NOTIFICATION TO LOCAL AUTHORITIES, LAW ENFORCEMENT, AND EMERGENCY RESPONSE OFFICIALS

When applying for a permit, the provincial/territorial road transport agency may direct trial organizations to notify other relevant departments, including federal, regional and municipal officials, local law enforcement and emergency response personnel (including occupational health and safety officers) of the dates and locations of any tests, to ensure that they are aware and prepared to address any safety issues that might arise, including specific information required for safely interacting with an ADS-dedicated vehicle.

3 AUTOMATED DRIVING SYSTEM REQUIREMENTS

REQUIREMENTS FOR DATA RECORDING DEVICE:

All trial vehicles should have a data recording device that records technical information about the status and operation of the ADS.

The relevant provincial or territorial road transport agency may require trial organizations to share data from the data recording device with them or with federal regulators for the purpose of conducting incident/collision investigations, or to address other issues related to road safety.

REQUIREMENTS FOR TRIALS WITH A DRIVER:

The trial organization should ensure that the trial vehicle meets the following requirements:

> The ADS can transition safely between automated and non-automated modes.

> The ADS has a warning system that alerts the driver of an incoming transition between automated and non-automated modes. These alerts should convey critical information clearly to the driver in the manner the trial organization sees fit.

> The ADS should also have a request to intervene function alerting the driver to perform the DDT fallback, with sufficient warning time. The function should allow the driver to disengage the automation function and allow the driver to assume manual operation of the vehicle, or bring it to a minimal risk condition.

> The automated vehicle should have a mechanism to alert the driver of an ADS failure.

REQUIREMENTS FOR TRIALS OF ADS-DEDICATED VEHICLES:

It is possible that trial organizations in Canada may seek to test level 4 and/or level 5 ADS-dedicated vehicles without a driver in the driver's seat or even present in the vehicle. In this case, the trial organization should ensure the following:

> The ADS has been previously tested (e.g. in a closed area or on-road in another jurisdiction) and is able to perform all DDTs, including OEDR within the designated ODD.

> The ADS-dedicated vehicle (without a driver present) is fitted with a two-way communication link between the vehicle and personnel overseeing the test to provide continuous information on the vehicle's location and status. This link should also allow two-way communication between these personnel and any passengers if the vehicle experiences any failures that would endanger the safety of the vehicle's passengers or other road users, or otherwise prevent the vehicle from functioning as intended, while operating without a driver.

> The trial organization is able to continuously monitor the status of the vehicle and the two-way communication link in real-time while the ADS-dedicated vehicle is being operated without a driver. Active real-time supervision of the ADS-dedicated vehicle operating without a driver is recommended at all times throughout trials.

> The ADS-dedicated vehicle has a warning system that alerts personnel overseeing the trial when the automated system disengages or an automated system failure occurs.

> The ADS-dedicated vehicle is capable of performing the DDT fallback and where necessary, achieve a minimal risk condition; and, that there are appropriate redundancies to perform these tasks in instances where the ADS disengages or an ADS failure occurs.

4 INSURANCE

Trial organizations must ensure that they have adequate liability insurance, in the form and manner required by the provincial/territorial authority.

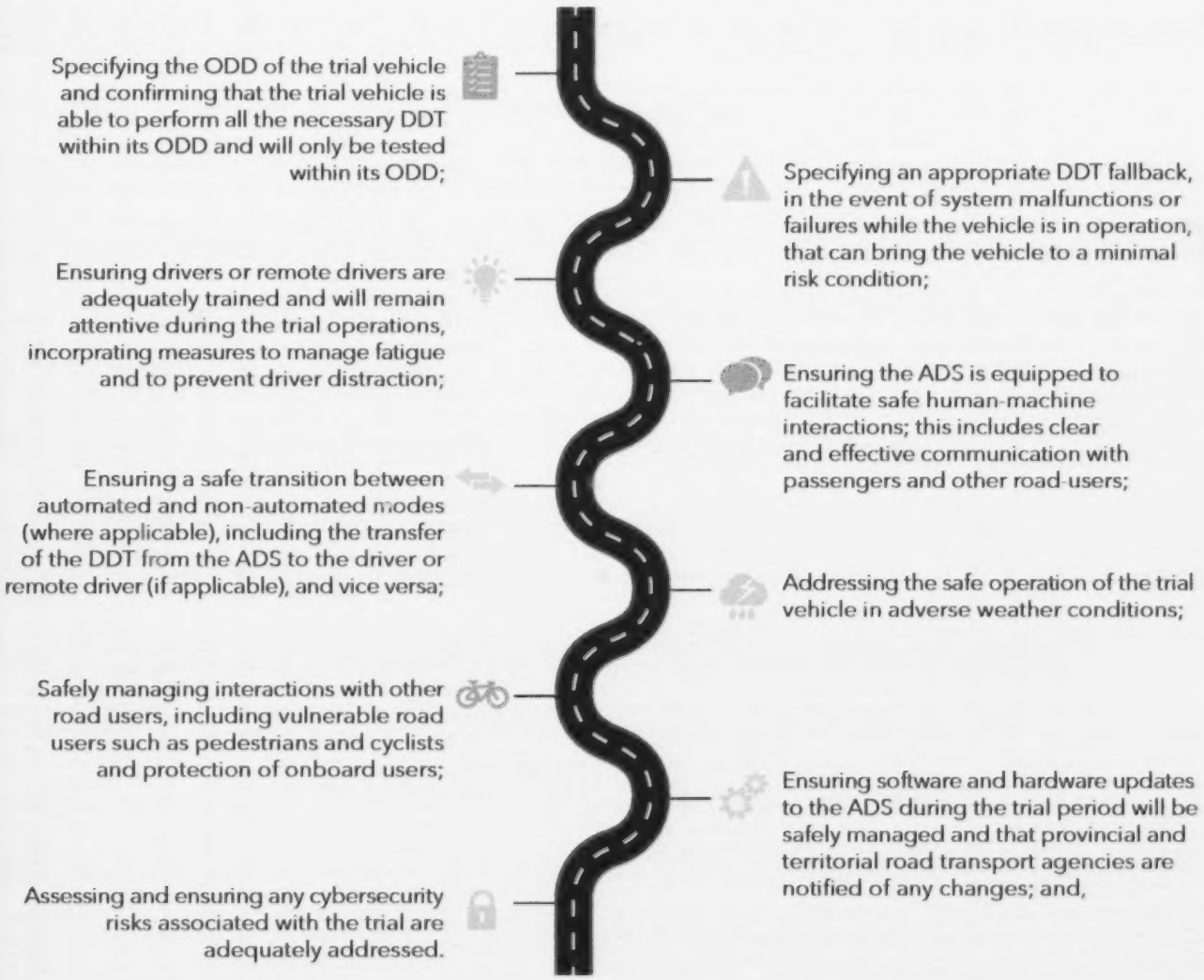
5 CROSS-BORDER TRIALS

Trial organizations must ensure compliance with the requirements of the *Motor Vehicle Safety Act* and its associated regulations regarding the importation of vehicles into Canada and the shipment of vehicles across provincial/territorial boundaries.

Trial organizations must notify Transport Canada and any provincial or territorial road transport agencies implicated in the cross-border trial and ensure compliance with any approval processes required by these provinces and territories for trials.

6 SELF-DECLARATION OF VEHICLE SAFETY

When seeking approval from a provincial/territorial road transport agency to conduct a trial, trial organizations may be asked to declare that they have given due consideration, and where necessary, incorporated appropriate measures, protocols, and equipment redundancies, to address various safety issues, including:


Specifying the ODD of the trial vehicle and confirming that the trial vehicle is able to perform all the necessary DDT within its ODD and will only be tested within its ODD;
Ensuring drivers or remote drivers are adequately trained and will remain attentive during the trial operations, incorprating measures to manage fatigue and to prevent driver distraction;
Ensuring a safe transition between automated and non-automated modes (where applicable), including the transfer of the DDT from the ADS to the driver or remote driver (if applicable), and vice versa;
Safely managing interactions with other road users, including vulnerable road users such as pedestrians and cyclists and protection of onboard users;
Assessing and ensuring any cybersecurity risks associated with the trial are adequately addressed.
Specifying an appropriate DDT fallback, in the event of system malfunctions or failures while the vehicle is in operation, that can bring the vehicle to a minimal risk condition;
Ensuring the ADS is equipped to facilitate safe human-machine interactions; this includes clear and effective communication with passengers and other road-users;
Addressing the safe operation of the trial vehicle in adverse weather conditions;
Ensuring software and hardware updates to the ADS during the trial period will be safely managed and that provincial and territorial road transport agencies are notified of any changes; and,

In some situations, road transport agencies may require trial organizations to provide additional information on the measures and protocols trial organizations have incorporated to address these safety issues. Provincial/territorial road transport agencies may choose to consult with Transport Canada when reviewing this information.

TEST CONSIDERATIONS:

1 DRIVER TRAINING AND RESPONSIBILITIES

Trial organizations are responsible for the safe operation of trial vehicles at all times, regardless of whether the ADS is engaged. Therefore, trial organizations should ensure that trial drivers, including remote drivers, have appropriate training to safely execute their responsibilities prior to conducting trials.

In all instances where the vehicle is operated without engaging the ADS, or when the vehicle is operated remotely, the trial driver/remote driver must hold a valid driver's license for the appropriate class of vehicle being tested that is recognized by the jurisdiction in which the test is being conducted.

The trial driver/remote driver should be familiar with, and understand the ADS, including its capabilities and limitations, and should be able to anticipate the need to intervene and resume operation when necessary and where applicable.

The trial driver/remote driver should continuously monitor the driving environment and be adequately trained to assume the fallback position when the automated system transfers operation, where applicable.

The provincial or territorial road transport agency may require trial organizations to provide records of driver training and relevant background checks for verification.

2 REPORTING AND RESPONDING TO SERIOUS INCIDENTS INVOLVING TRIAL VEHICLES

DISENGAGEMENTS

Trial organizations should provide reports on unplanned disengagements of the ADS as required by the provincial or territorial road transport agency that provided the permit. The road transport agency is encouraged to share the reports with Transport Canada officials to inform the development of future safety policies.

SERIOUS INCIDENTS

Trial organizations should notify the provincial or territorial road transport agency responsible for approving the trial of any serious incident[8] involving trial vehicles. When warranted, a motor vehicle collision report will then be compiled as required by the provincial or territorial road transport agency with the assistance of local law enforcement. This information will be shared in turn with Transport Canada. Trial organizations will be directed by the provincial/territorial road transport agency on the protocols for contacting local law enforcement and emergency personnel on collisions when applying for a permit.

In the event of a collision causing bodily injury or death, the trial organization should submit a preliminary report to the provincial/territorial road transport agency that provided the permit within 24 hours of the collision (or as otherwise

8 See definition of serious incident on page 8.

required under provincial law or regulations) and immediately postpone trial activities involving any of the persons or vehicles involved until further direction is provided from the road transport agency.

Trial organizations must cooperate with authorities during a collision investigation and provide assistance with data retrieval from recording devices.

When trial organizations provide disengagement and/or incident reports to the provincial or territorial transport agency, the agency should share these reports with Transport Canada.

3 ENCOURAGING INFORMATION SHARING AND COLLABORATION ON EMERGING TECHNOLOGIES

Supporting the safe development of ADS trials is an ongoing learning experience for both policy makers and trial organizations. To help facilitate a collaborative working relationship and information sharing, trial organizations are encouraged to engage with authorities (through presentations, teleconferences etc.) during the trial period to help enhance officials' knowledge of emerging technologies. Trial organizations are also encouraged to allow Transport Canada and provincial/territorial road transport agencies to observe trials in person and to provide advance notice of trials that will be open to the general public.

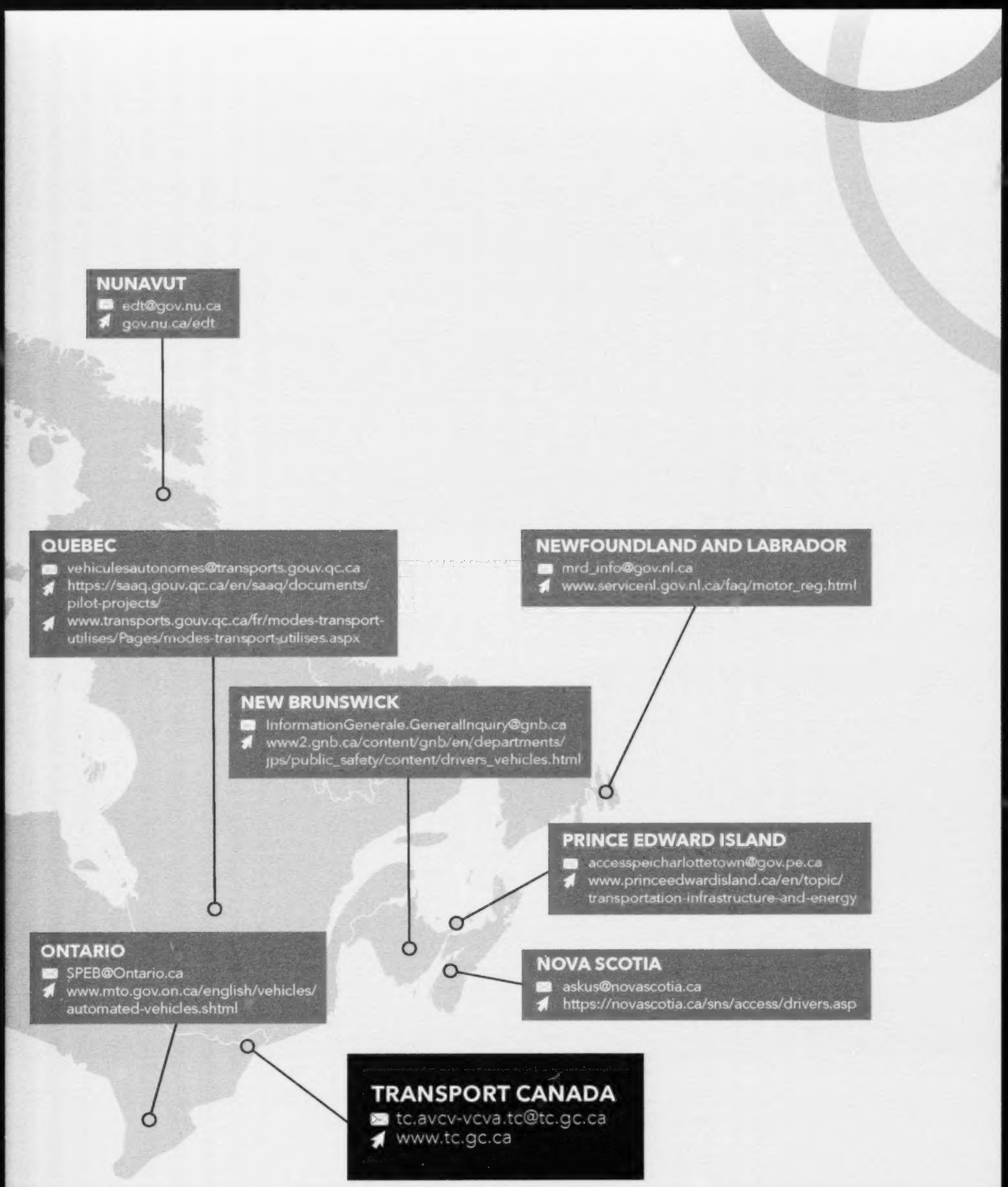
POST-TEST CONSIDERATIONS

1 SHARING BEST PRACTICES AND INFORMATION ON TRIAL OUTCOMES

Trial organizations are encouraged to share best practices and lessons observed with respect to the conduct of trials and to provide feedback to relevant federal, provincial and territorial authorities regarding the regulatory requirements and permit procedures they have been required to follow.

Provincial and territorial road transport agencies may also encourage trial organizations to provide an end-of-trial report to officials on research and trial outcomes, to help inform future policies and programming related to ADS testing and deployment. Provincial and territorial road transport agencies are encouraged in turn to share these reports with Transport Canada officials. While these reports would not necessarily require trial organizations to share commercially sensitive and/or proprietary information, appropriate measures to protect trial organization data will be implemented where necessary. These measures would be informed by existing procedures that Transport Canada has established with manufacturers to facilitate defect and collision investigations, as well as other research activities.

ANNEX A: CONTACTS PAGE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www.servicenl.gov.nl.ca/faq/motor_reg.html
NEW BRUNSWICK
InformationGenerale.GeneralInquiry@gnb.ca
www2.gnb.ca/content/gnb/en/departments/jps/public_safety/content/drivers_vehicles.html
PRINCE EDWARD ISLAND
accesspeicharlottetown@gov.pe.ca
www.princeedwardisland.ca/en/topic/transportation-infrastructure-and-energy
ONTARIO
SPEB@Ontario.ca
www.mto.gov.on.ca/english/vehicles/automated-vehicles.shtml
NOVA SCOTIA
askus@novascotia.ca
https://novascotia.ca/sns/access/drivers.asp
TRANSPORT CANADA
tc.avcv-vcva.tc@tc.gc.ca
www.tc.gc.ca

ANNEX B: LEVELS OF AUTOMATION

The following table was sourced with permission from SAE International's *Surface Vehicle Recommended Practice: Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles*, J3016 (2016). This document can be accessed for free at the SAE International website: **www.sae.org**

LEVEL	NAME	NARRATIVE DEFINITION	DDT		DDT FALLBACK	ODD
			Sustained lateral and longitudinal vehicle motion control	OEDR		
DRIVER PERFORMS PART OR ALL OF THE DDT						
0	**NO DRIVING AUTOMATION**	The performance by the *driver* of the entire *DDT*, even when enhanced by *active safety systems*.	*Driver*	*Driver*	*Driver*	N/A
1	**DRIVER ASSISTANCE**	The *sustained* and *ODD*-specific execution by a *driving automation system* of either the *lateral* or the *longitudinal vehicle motion control* subtask of the DDT (but not both simultaneously) with the expectation that the *driver* performs the remainder of the *DDT*.	*Driver and System*	*Driver*	*Driver*	Limited
2	**PARTIAL DRIVING AUTOMATION**	The *sustained* and *ODD*-specific execution by a *driving automation system* of both the *lateral* and *longitudinal vehicle motion control* subtasks of the *DDT* with the expectation that the *driver* completes the *OEDR* subtask and supervises the *driving automation system*.	***System***	*Driver*	*Driver*	Limited
ADS ("SYSTEM") PERFORMS THE ENTIRE DDT (WHILE ENGAGED)						
3	**CONDITIONAL DRIVING AUTOMATION**	The *sustained* and *ODD*-specific performance by an ADS of the entire DDT with the expectation that the DDT *fallback-ready user* is *receptive* to *ADS*-issued *requests to intervene*, as well as to *DDT performance-relevant system failures* in other *vehicle* systems, and will respond appropriately.	*System*	***System***	*Fallback-ready user (becomes the driver during fallback)*	Limited
4	**HIGH DRIVING AUTOMATION**	The *sustained* and *ODD*-specific performance by an *ADS* of the entire *DDT* and *DDT fallback* without any expectation that a *user* will respond to a *request to intervene*.	*System*	*System*	***System***	Limited
5	**FULL DRIVING AUTOMATION**	The *sustained* and unconditional (i.e., not *ODD*-specific) performance by an ADS of the entire *DDT* and *DDT fallback* without any expectation that a *user* will respond to a *request to intervene*.	*System*	*System*	*System*	**Unlimited**

SPEED
50 Km/H
50